Online Short-Term Forecast of System Heat Load in District Heating Networks

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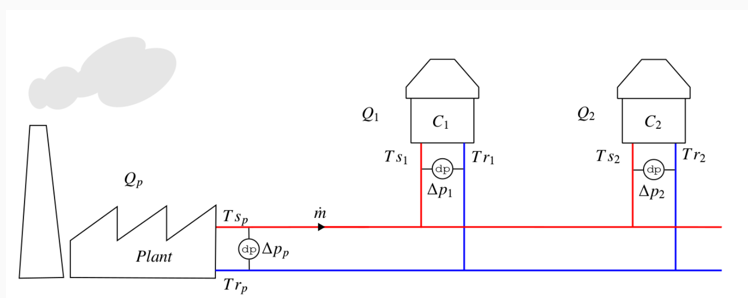
Introduction

Background and goal



Background and goal

Motivation Predicting energy use is essential for effective operation planning

Goal To accurately predict Heat Load requirement for a Housing network

Parsing the title

Online Short-Term Forecast of System Heat Load in District Heating Networks

Parsing the title

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- Variable values are available each step of the model

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- 12 – 24h ahead

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- Total heat load in central plant

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- Variable values are available each step of the model
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- Total heat load in central plant
- Central plant distributes heat to network

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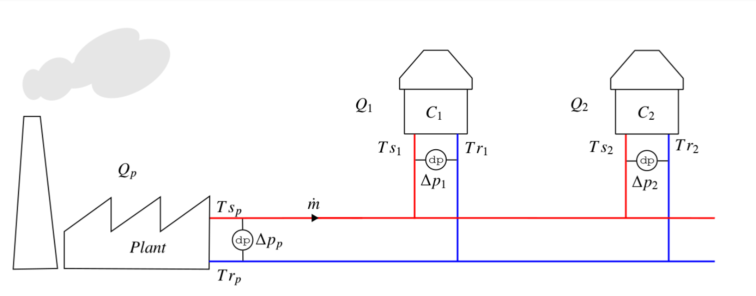


Parsing the title

Online Short-Term Forecast of System Heat Load in District Heating Networks

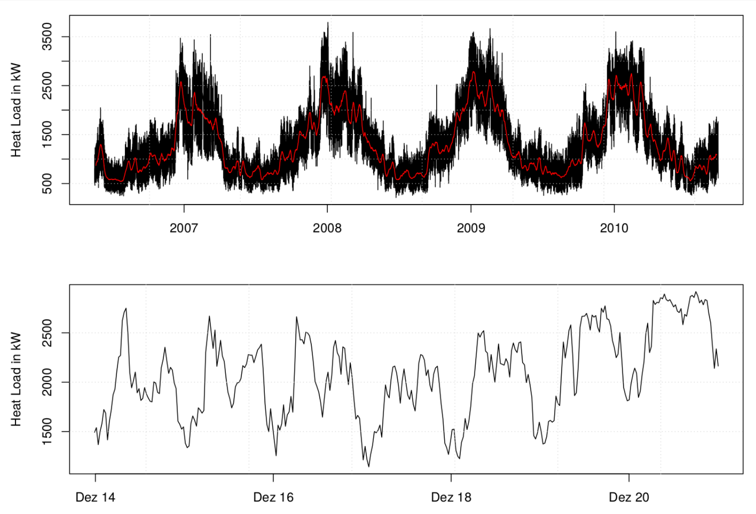
- Variable values are available each step of the model
- 12 – 24h ahead
- Total heat load in central plant
- Central plant distributes heat to network

Material and Methods

Data

- System heat load
- 84 buildings in Tanheim, Austria
- Between 05/18/2006 and 09/22/2010
- 30-minute intervals

Data



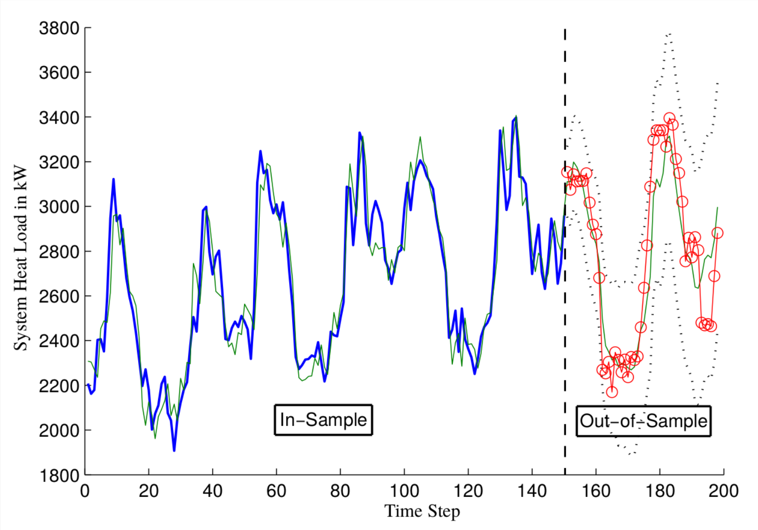
Model

Seasonal AutoRegressive Integrated Moving Average (SARIMA) model

- Time-series
- Repeating patterns – trends
- Short-term correlations
- R and Matlab

Results and Conclusion

Results



Performance

- Accuracy determined by Mean Average Percentage Error (MAPE)
- MAPE calculated over 24 and 48 steps ahead (12h and 24h)
- Predictions compared to real data
- MAPE of 4.4% in one example

Conclusion

Positives

- Results seem (very) good
- Could potentially be used in other networks

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- Could potentially be used in other networks

Negatives

- Scalability?
- MAPE result only shown for only one example
- More than 24h-ahead predictions?

Questions?

SARIMA model

S *Seasonal:* repetitive patterns

AR *AutoRegressive:* variable is regressed on its own lagged values

I *Integrated:* values are replaced with the difference between their values and the previous values

MA *Moving Average:* regression error is a linear combination of previous error terms

MAPE boxplot